# PatrickHeatherConsultancy

# European & Global Hub Markets:

## What does the future hold for hubs in the spot-priced gas market?

**Gas and LNG Supply Contracts Forum**

*Berlin, 21st June, 2018*


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# Patrick Heather

- In the commodity markets since 1981:
  - as broker, trader, manager
- Most of career in energy markets:
  - oil, oil products, gas and power
- Joined PowerGen in 1996: established gas trading capabilities
  - On several industry committees: inc. NBP'97 & standardised spark spd
  - Established Within-Day market by trading on-the-day flat gas at the NBP, the first ever such deal
  - Established Other trading firsts: IPE gas futures, 10yr flat gas NBP trade, standardised spark spread, NBP financial swap and others
  - In 2000, set-up PowerGen's electricity trading desk
- In 2002, recruited to BG Group as Trading Manager
  - Set-up their trading capability from scratch
  - Introduced the concept of 'portfolio optimisation' to a company that had been very much focused on operational issues

# Patrick Heather

- Since 2004, Patrick has been an independent consultant
  - Advising and giving presentations to many organisations:
    - from the European Commission, regulators and governments, to the APX and ICE futures exchanges, to financial institutions and to various producer, mid-stream and end user companies
    - in Australia, Austria, Brazil, Britain, China, Estonia, France, Greece, Holland, India, Italy, Japan, Norway, the Philippines, Poland, Russia, Sweden and Turkey
  - Acting as Expert/Expert Witness:
    - Enron, Austrian utility, UK investment bank, Gas Supplier (SEE), Gas Marketer (NWE), Gas Marketer (SWE), Gas Supplier (NWE)
  - Lecturing at various seminars/universities/schools:
    - Florence School of Regulation, Warwick University, Bocconi School of Management, University of Tartu, Eurasia Energy Summer School
- Nov 06-Dec 09: Commercial Advisor to South Hook Gas
- Since 05: Senior Fellow of the Oxford Institute for Energy Studies

# Patrick Heather Consultancy Limited

- An Energy Markets consultancy, specialising in the European utility sector, covering gas, electricity, emissions and coal and, in the energy forwards and futures markets.
- Advising on trading, risk-management and portfolio optimisation issues but also on providing marketing and business advice.
- Giving presentations on the utility/traded markets and related topics.
- Providing practical knowledge and experience in trading, managing trading operations, setting up trading desks, contract negotiation and Client representation.
- Providing Expert Opinion in gas contract litigation and other energy trading related cases.

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# Oxford Institute for Energy Studies

Patrick Heather is a Senior Research Fellow at the OIES, focusing on the gas markets, in Britain, Continental Europe and Asia.

His published works are available on the Institute's website or by using the DOI links:

"The Evolution and Functioning of the Traded Gas Market in Britain"
**https://doi.org/10.26889/9781907555152**

"Lessons from the February 2012 European gas 'crisis'"
**https://www.oxfordenergy.org/publications/lessons-from-the-february-2012-european-gas-crisis-2/**

"Continental European Gas Hubs: are they fit for purpose?"
**https://doi.org/10.26889/9781907555510**

"The evolution of European traded gas hubs"
**https://doi.org/10.26889/9781784670467**

**"European traded gas hubs: an updated analysis on liquidity, maturity and barriers to market integration"**
**https://doi.org/10.26889/ei13.201705**

**"The SPIMEX Gas Exchange: Russian Gas Trading Possibilities"**
**https://doi.org/10.26889/9781784671013**


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# Outline

## What makes a successful traded gas hub

- The Path to Maturity
- How traded gas hubs help the gas markets evolve
- Which are the successful gas hubs globally?

## European gas hubs in 2017

- The 5 Key Elements
- The 3 Main Indicators

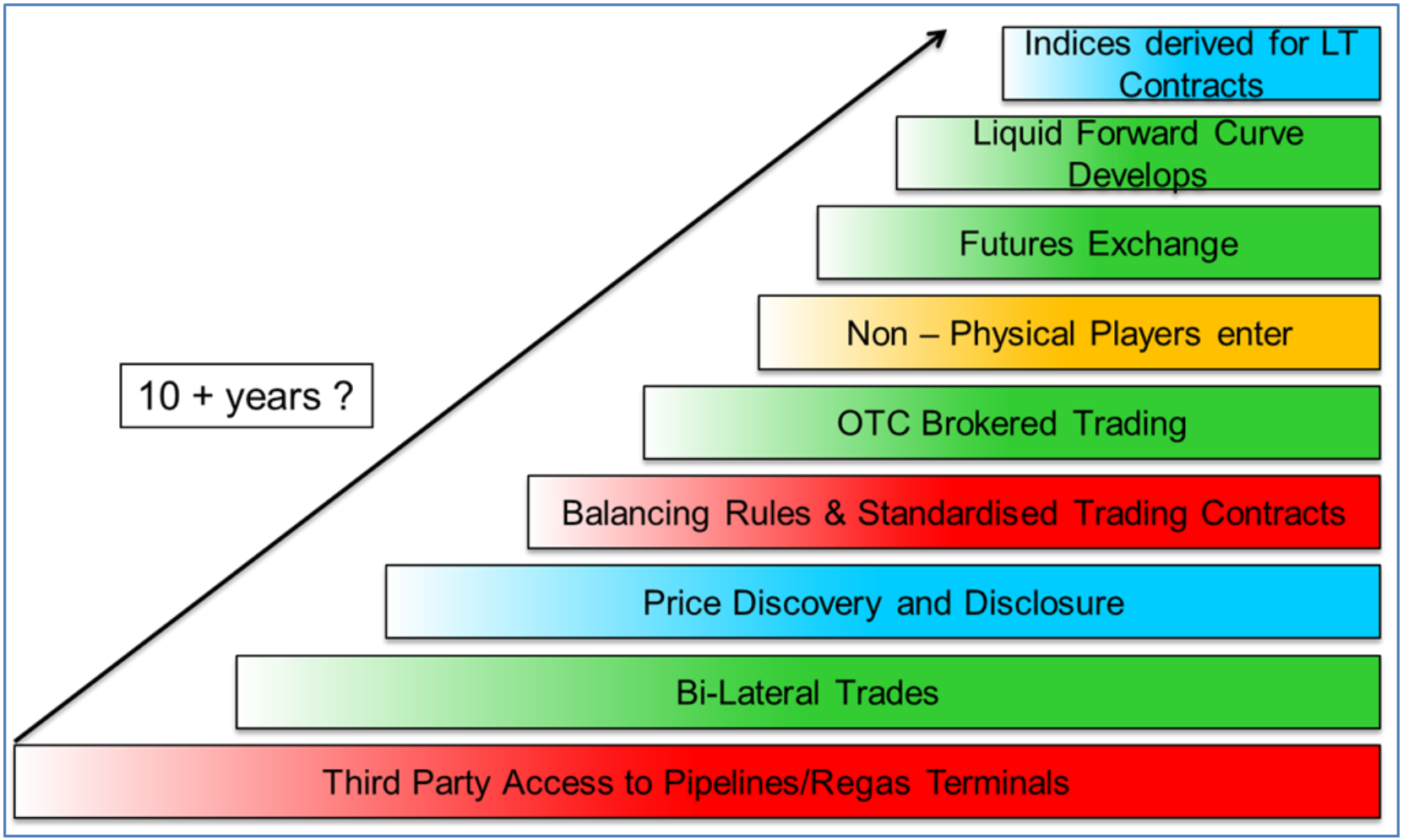
## Summary and Conclusion

- The future of hubs in a spot-priced gas market

# What makes a successful traded gas hub

## The path to maturity

# What constitutes a 'good' hub?




Source: Heather (2015)

**The 'Path to Maturity' starts with Third Party Access and, over a period of time, develops to provide first OTC then financial products, ending with Indices used as reference prices in physical contracts**

# 3 Main Indicators

There are 3 main indicators that reveal the **level of liberalisation** and **market development** of traded gas hubs

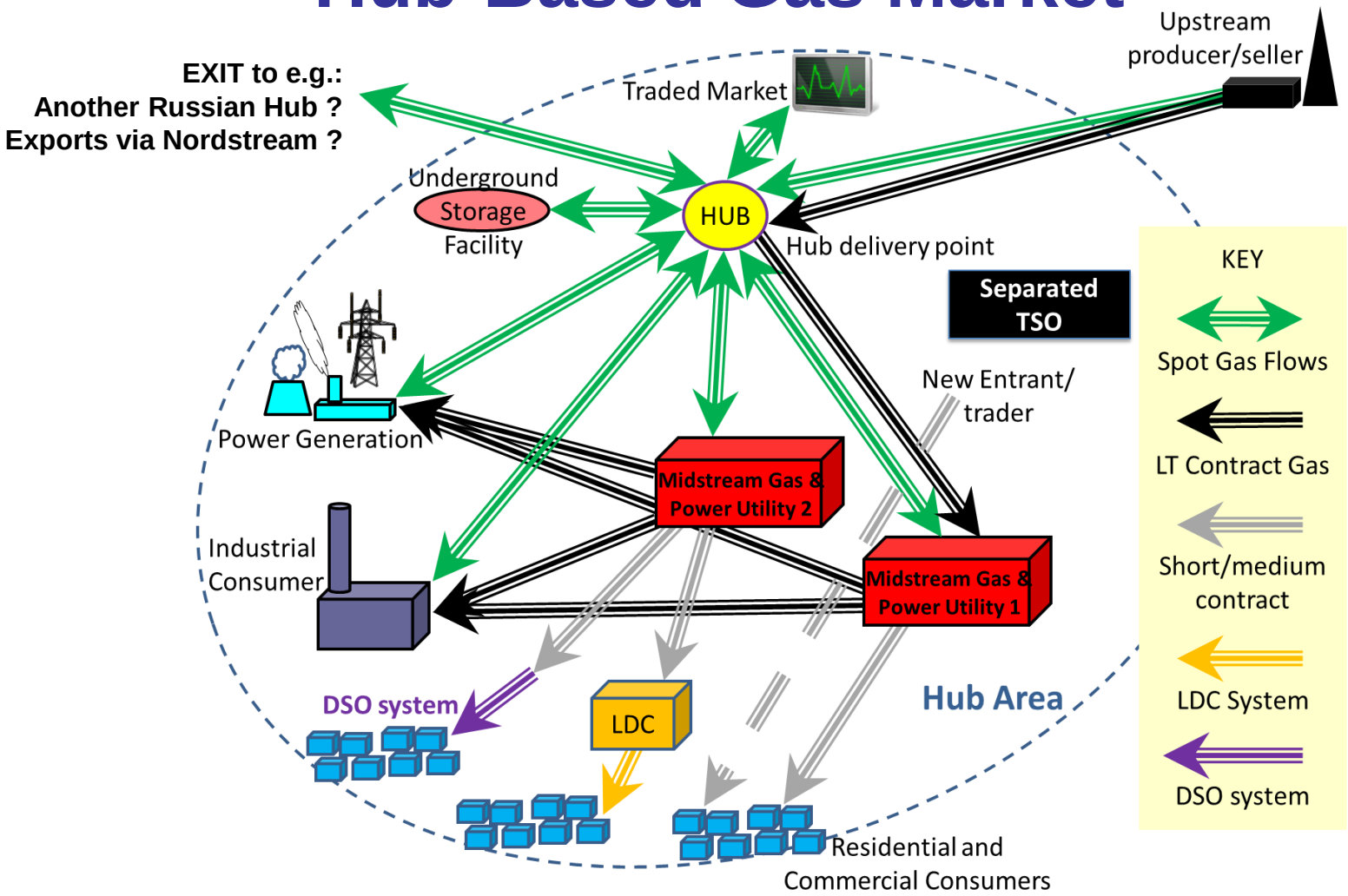
The 3 main indicators are:

- The **political will** to create the necessary framework
- The **cultural attitudes** to trading and change
- Which in turn then dictate the level of **commercial acceptance** in order to allow the market to organically grow

These 3 main indicators are the basis of creating successful traded gas markets out of the 'old world' monopolistic era

**These metrics are somewhat subjective but are essential to allowing a traded gas market to develop; however, they do not in themselves guarantee that a market will succeed and become mature**

# Hub-Based Gas Market




**THE 'NEW WORLD' HUB-BASED GAS MARKET: all producers bring their gas supplies to the hub market, usually the gas grid situated in the demand area; all buyers make their purchases from the hub, including exports (whether national or international) from the hub to another; re-trading takes place**

# Mature Traded Hubs

- 'Mature' traded hubs **have**:
  - Good liquidity, good volumes, often high volatility
  - Often a benchmark
  - Are a true market place, reflective of supply/demand
  - Not just a physical transfer point but also attracting 'speculative' trading
- 'Mature' traded gas hubs **are**:
  - **Henry Hub**: the first traded gas hub and ***the*** North American benchmark
  - **NBP**: the first traded gas hub in Europe and ***the*** British and NWE Sterling benchmark
  - **TTF**: has developed to be the Continental Leader and ***the*** European Euro benchmark

**The change in gas price formation that has necessitated a robust and reliable marker price to be able to risk manage gas portfolios**

# What makes a successful traded gas hub

## How traded gas hubs help the gas markets to evolve

# Mature OTC gas markets: their function

- Open and Transparent markets:
  - Foster trading, competition and, ultimately, the ‘best’ or ‘right’ price at any given time
  - Attract many participants of different types who bring liquidity
- Liquid markets allow for the ability to:
  - Physically adjust portfolio volumes over time
  - Financially risk manage gas portfolios
- Mature gas markets can help provide:
  - Security of supply and security of demand
  - Providing a market place for the buying and selling of, usually, marginal quantities of physical gas

**Most of all, mature, open, transparent and liquid markets provide secure Risk Management tools**

# Gas exchanges: their role and function

- Price Discovery & Transparency
  - The ability to know the price of gas now and in the future (up to twelve years ahead on Nymex Henry Hub, six years on ICE NBP and five years for ICE-Endex TTF)
  - Publicly and easily accessible
- Supply/Pricing flexibility
  - The ability to separate price function from supply function
- Physical balancing
  - Providing a market place for the buying and selling of, usually, marginal quantities of physical gas
- **Risk Management**
  - Providing a facility for managing price risk through a secure and **regulated** market – hedging and trading

**Exchanges are complementary to the OTC markets and assist in the development of traded gas hubs in a secure, regulated environment**

# What makes a successful traded gas hub

## Which are the successful hubs globally?

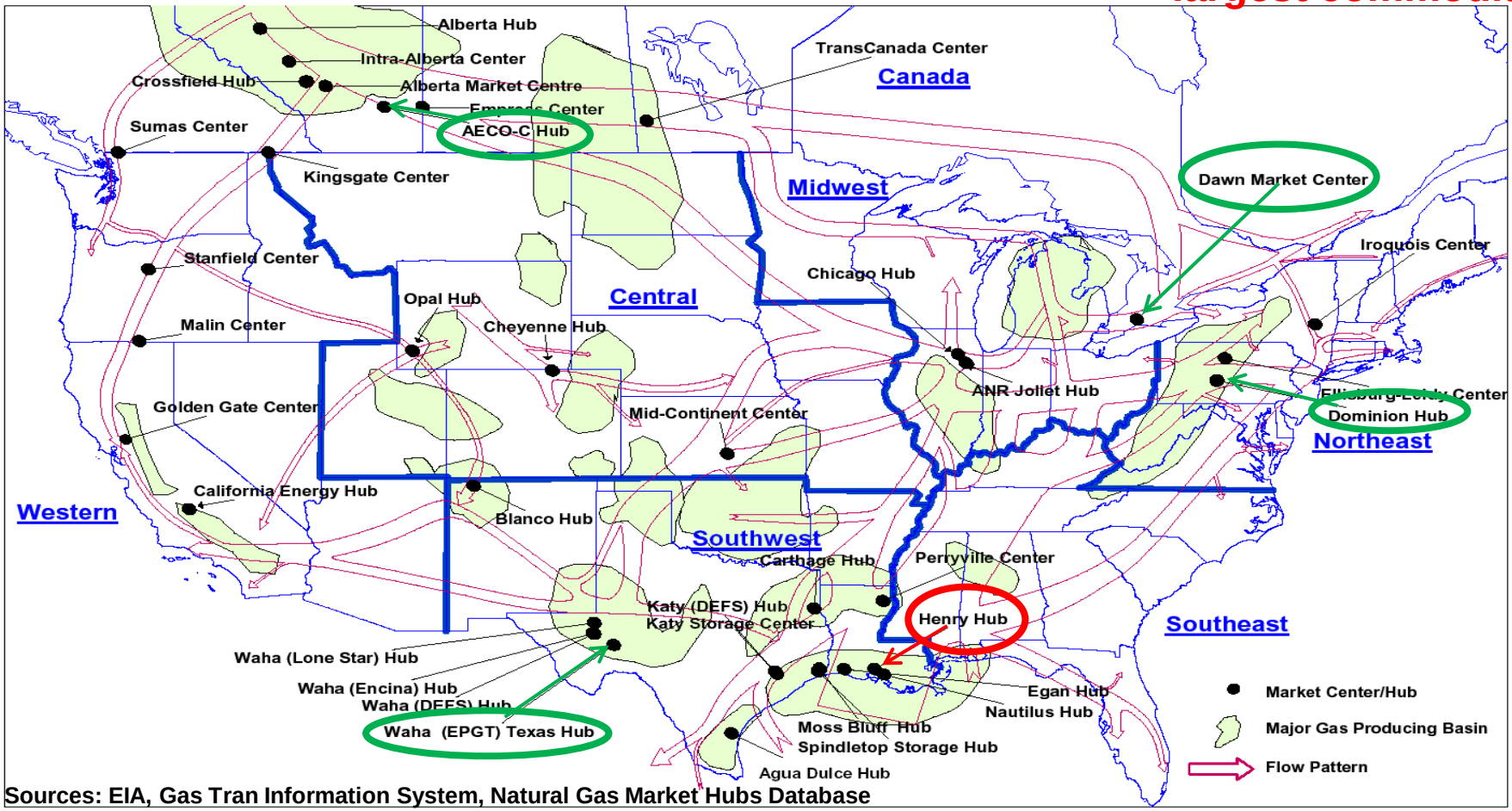
# North American gas regions, markets and hubs

**Seven regions** serve **33 Market Centers/Hubs**

Traders 'wheel' gas shipments from hub to hub

**Henry Hub** in Louisiana is the **Benchmark Hub**

**NYMEX HH futures contract: the most traded gas contract in the world (and 3rd largest commodity)**




Sources: EIA, Gas Tran Information System, Natural Gas Market Hubs Database

**US was the first market to liberalise but it has a 'complicated' structure**

# N. American gas is being market priced

Market pricing clearly dominates the North American market:

- Fully liquid trading markets in the USA and Canada
- Wholesale price in Mexico being referenced to prices in the USA

**North America has almost total market pricing; a very small amount (<1%) of No Price in Mexico for gas used in refinery process and enhanced oil recovery**

# European gas regions, markets and hubs

## ICE NBP and ICE-Endex TTF futures contracts: the most traded in Europe


**Only two mature, Benchmark gas trading hubs in Europe: NBP and TTF**

# European gas is being market priced

Europe as a whole is now **72%** market priced, 25% oil indexation and 3% regulated

- Britain essentially has **100%** market pricing

Britain has had market pricing for many years; price formation on the Continent is changing, at a different pace North-West vs. South-East

- Continental Europe is now **c.67%** market priced
- Continental Europe is still c.29% oil indexation *[plus 4% regulated pricing]*
- Increasing volume of spot priced gas
- Eastern and Southern Europe resisting change

**How long the transition to fully liberalised, commercial, hub-priced gas markets will take to complete is uncertain: it will take time and it will be costly but competition will mean that gas-to-gas pricing will ultimately prevail**

# Potential Asian gas markets and hubs

Chinese contenders, by virtue of serving the largest demand area in the region, do have potential but there are many issues to resolve to enable free competitive wholesale trading in gas


**Singapore currently seems best suited as regional natural gas trading hub: unbundled gas and power infrastructure; wholesale gas pricing; open access SLNG terminal; well placed geographically to serve all Asia-Pacific**

# Asia/A-P gas predominantly oil priced

Traded gas markets in this region are in their infancy:

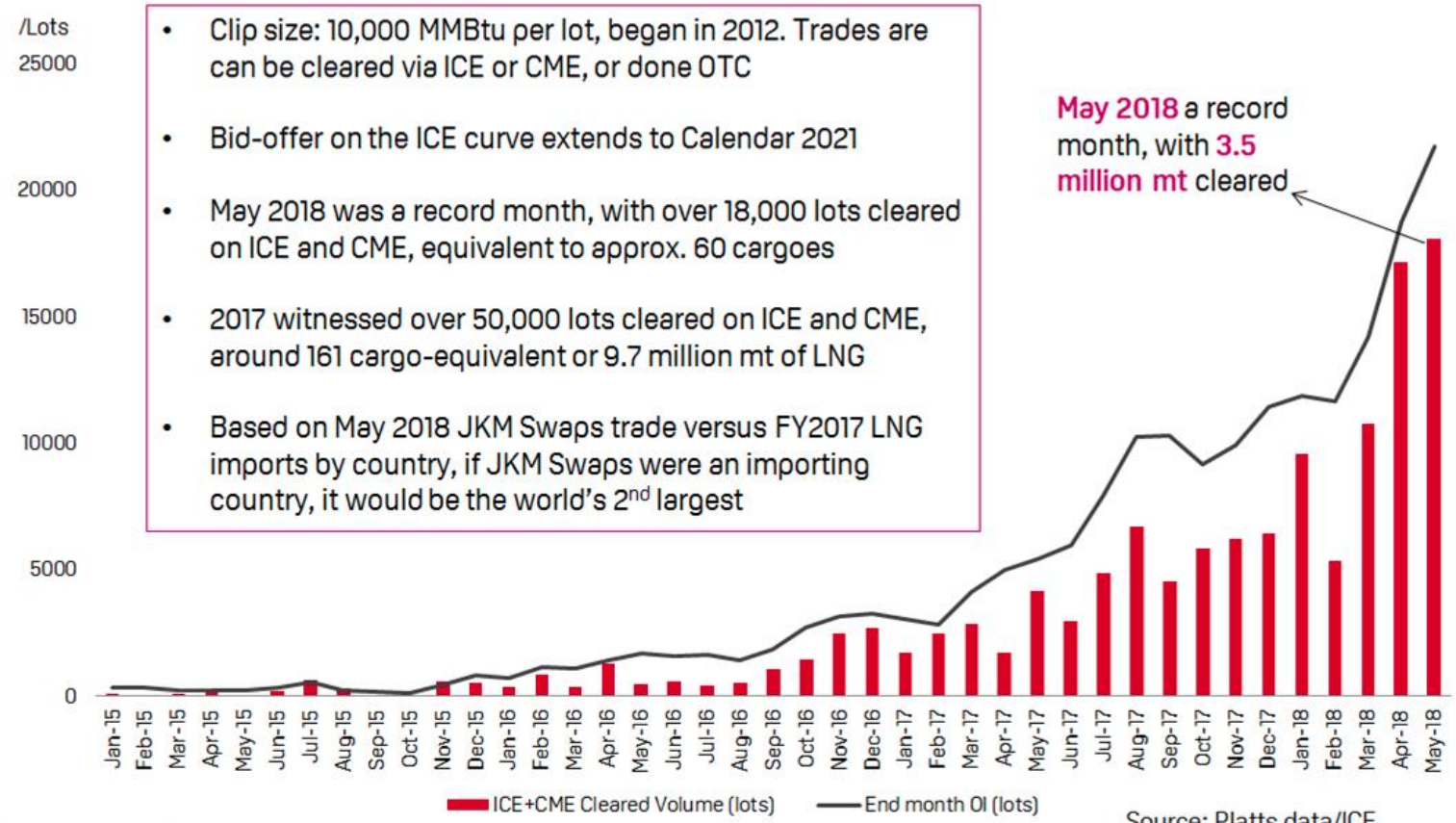
- Uncertain which market/s might develop as a credible benchmark on which to price contracts
- Multiple pricing areas might develop:
  - China, Japan, South Korea, Singapore
- A number of gas indices now being reported

**Current JCC based indexation is no longer appropriate; buyers would prefer market pricing but, due to dominance of LNG as source of supply with little or no pipeline alternatives, it is not clear how the transition will take place**

# JKM is gaining in popularity

## Jan-May 2018 JKM cleared derivatives almost 12 million mt, close to five-fold year-on-year growth

- Clip size: 10,000 MMBtu per lot, began in 2012. Trades are can be cleared via ICE or CME, or done OTC
- Bid-offer on the ICE curve extends to Calendar 2021
- May 2018 was a record month, with over 18,000 lots cleared on ICE and CME, equivalent to approx. 60 cargoes
- 2017 witnessed over 50,000 lots cleared on ICE and CME, around 161 cargo-equivalent or 9.7 million mt of LNG
- Based on May 2018 JKM Swaps trade versus FY2017 LNG imports by country, if JKM Swaps were an importing country, it would be the world's 2nd largest




Source: Platts data/ICE data/CME data

S&P Global Platts

**Source: Platts (from Platts, ICE and CME data)**

**With 40-45 market participants, JKM trades have seen exponential growth: 2016 12,717 lots; 2017 50,236 lots; Jan-May 2018 over 60,000 lots**

# Global gas market churn rates

Probably the most important factor in determining a gas hub's commercial success. Churn rates are an excellent measure of a hub's real liquidity and success and are a parameter used in most commodity and also financial markets

Commodity markets are deemed to have reached **maturity** when the churn is in **excess of 10 times**

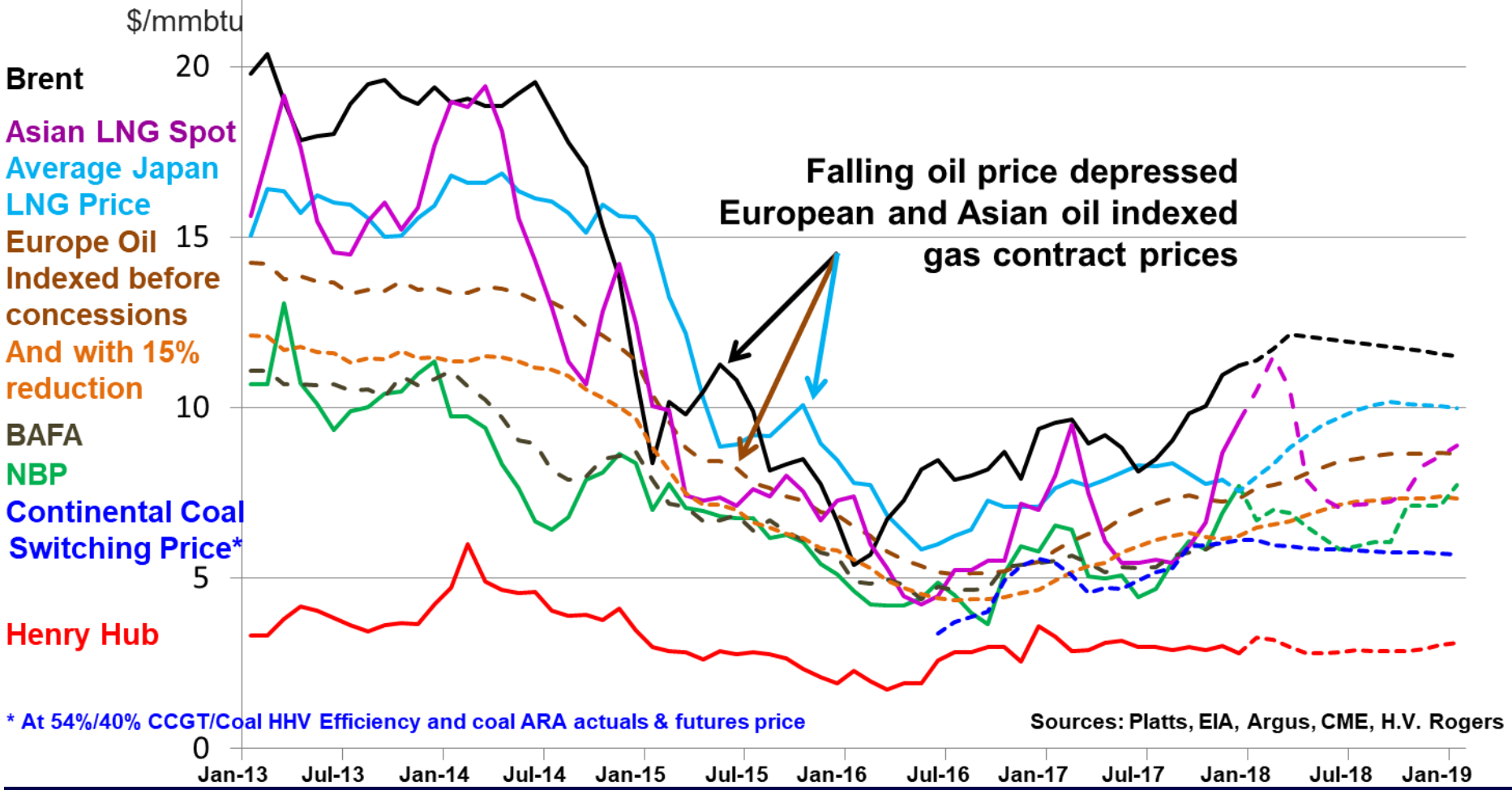
**Financial** players will usually only trade in markets with a churn **in excess of 12**

| Representative churn rates 2016/17 (trading/consumption) | | |
|---|---|---|
| **Country** | **Hub** | **Churn** |
| United States | All USA | c.61-90 |
| Netherlands | TTF | 55.2 |
| Britain | NBP | 24.7 |
| Austria | VTP | 5.3 |
| Germany | NCG+GPL | 3.0 |
| Belgium | ZEE+ZTP | 2.9 |
| Rest of Europe | FR,IT,CZ,ES | 0.2-1.3 |
| Asia | No hubs yet; Limited spot trading | |

Sources: EIA, LEBA, ICIS, ICE, ICE-Endex, PEGAS, CME, CEGH, GME; MIBGAS, P.Heather

**There are three successful, mature, benchmark hubs today: Henry Hub, NBP and TTF; no other hub is even near to the 10x criterion for mature markets**

# Global gas and Brent prices: January 2013 – December 2017 (curve to Dec18)




**Low oil indexed prices provide 'ceiling' for hub prices and put pressure on LNG spot prices. Henry Hub and European hub prices further depressed by weak fundamentals; global gas prices are increasingly more closely correlated**

# European gas hubs in 2017

## The 5 Key Elements
## and
## The 3 Main Indicators

# 5 Key Elements

In order to evaluate the **depth, liquidity** and **transparency** of the traded gas hubs across Europe, I analyse the results of 5 key elements; as far as these are available

The 5 key elements analysed are:

- **who** trades in each of the hubs
- what **products** are traded there
- how much **volume** is traded, and over which periods
- the **Tradability Index**
- the **churn rates**

They are all important but the churn is the most

**It is essential to review as a minimum these 5 criteria to permit a rigorous analysis; but not all of the elements are always available in all of the hubs**

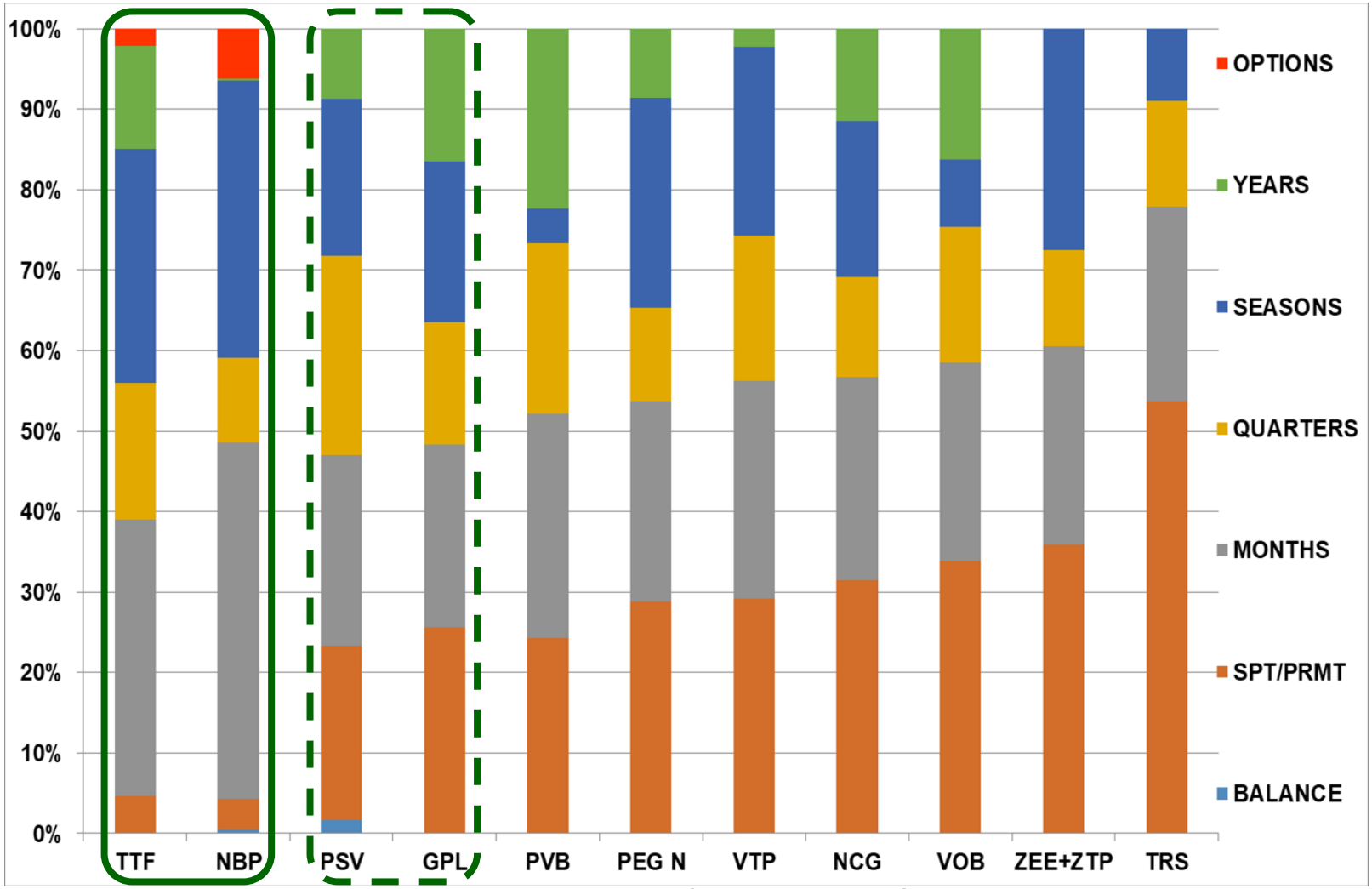
# Market Participants

| 2017 | OTC Active Traders* | | | | | |
|---|---|---|---|---|---|---|
| HUB | Total Market | | | S/P/M** | Q/S/Y*** | Hub Score^ |
| | 2014 | 2015 | 2016 | 2017 | 2017 | 2017 |
| TTF | 30 | 45 | >40 | 90 | 75 | 240 |
| NBP | 40 | 45 | >40 | 65 | 60 | 185 |
| NCG | 25 | >25 | 30 | 70 | 45 | 160 |
| GPL | | | | 60 | 35 | 130 |
| PSV | 12 | 15 | 18 | 45 | 30 | 105 |
| CEGH/VTP | 10 | 15 | 15 | 50 | 25 | 100 |
| PVB | <5 | <10 | <10 | 20 | 12 | 44 |
| PEG Nord | 10 | 10 | 15 | 30 | 6 | 42 |
| ZEE | 15 | 15 | 15 | 25 | 5 | 35 |
| ZTP | | | | 20 | 5 | 30 |
| PEG TRS | 5 | 5 | <10 | 12 | 5 | 22 |
| VOB | <10 | <10 | <10 | 15 | 3 | 21 |

* The estimated number of traders who regularly trade – Note: different methodology for 2017;
** Spot / Prompt / Months contracts; *** Quarters / Seasons / Years contracts.
^ Hub score calculated as (1xS/P/M) + (2xQ/S/Y)

**The more 'active' participants there are, the more liquidity there will be in a market; important in the mid-far curve for risk management trades**

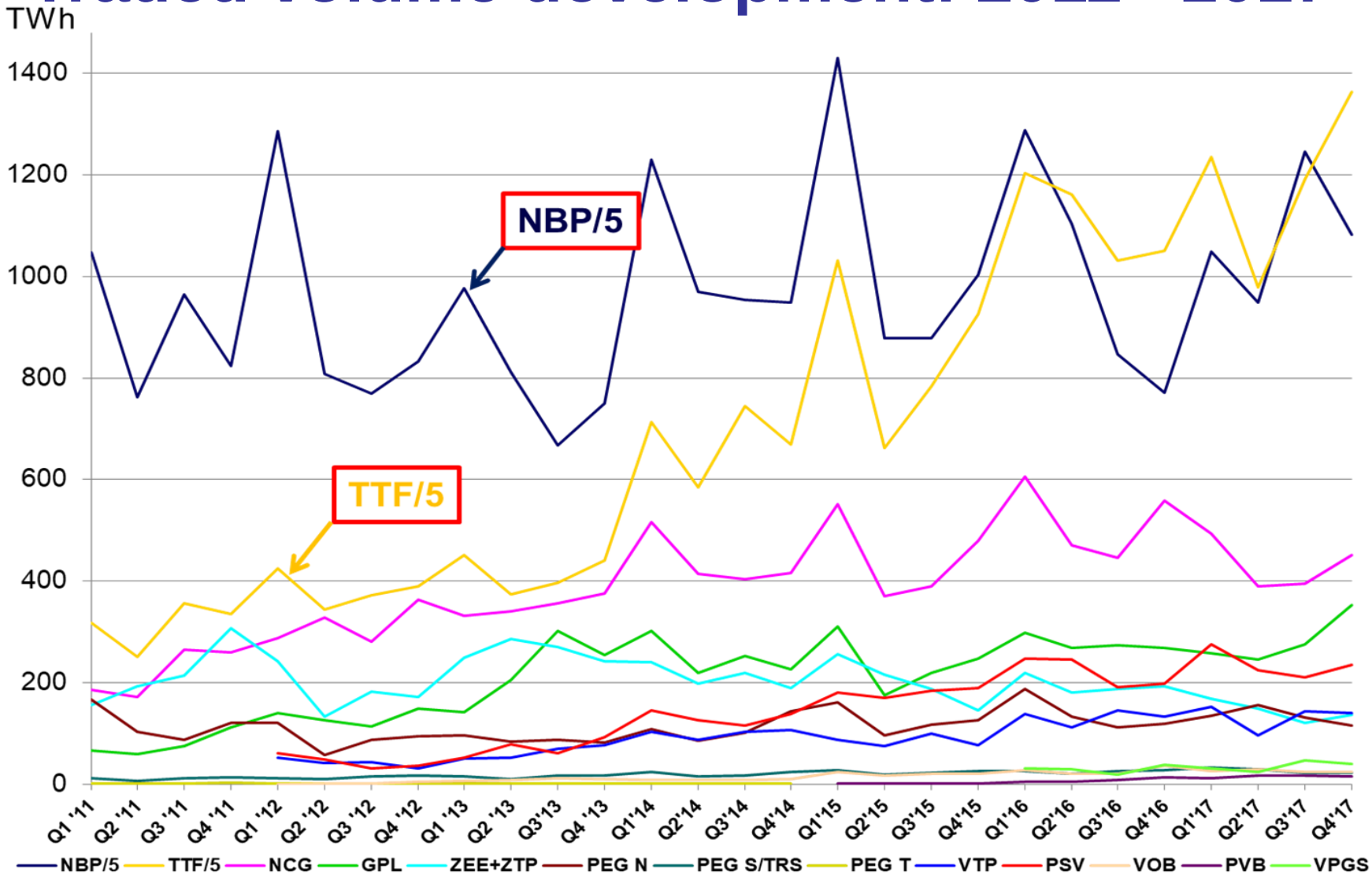
# Traded product splits (% total volume): 2017




Sources: OTC: LEBA, ICIS; Exchange: ICE, ICE-Endex, PEGAS, CME, CEGH, GME; MIBGAS; P. Heather

**Interesting product splits across the hubs: TTF and NBP 'mature' risk management hubs including options (NBP 6%), through to VOB, ZEE+ZTP and TRS with >33% spot/prompt trades; PSV and GPL have improved their position**

# Traded volume development: 2011 - 2017




Sources: LEBA; ICIS; ICE ; ICE-Endex ; EEX ; Powernext ; PEGAS; CEGH ; GME; CME; MIBGAS; TGE; P. Heather

**TTF has seen phenomenal rise in activity since 2014; NBP has remained fairly steady but has lost some risk management volume; TTF now largest hub**

# Summary of the 5 Key Elements

| 2017 | 5 KEY ELEMENTS | | | | | |
|---|---|---|---|---|---|---|
| HUB | Active Market Participants* | Traded Products* | Traded Volumes | Tradability Index (Q4) | Churn Rate | Score /15** |
| TTF | 240 | 49 | 23855 | 20 | 55.2 | 15 |
| NBP | 185 | 44 | 21620 | 16 | 24.7 | 14 |
| NCG | 160 | 22 | 1730 | 15 | 3.4 | 9 |
| GPL | 130 | 20 | 1130 | 14 | 2.6 | 9 |
| VTP | 100 | 17 | 530 | 10 | 5.3 | 9 |
| PSV | 105 | 19 | 945 | 14 | 1.2 | 8 |
| ZEE+ZTP | 35+30 | 16 | 550 | 8 | 2.9 | 6 |
| PEG Nord | 42 | 17 | 540 | 12 | 1.7 | 6 |
| VOB | 21 | 12 | 100 | 6 | 1.1 | 5 |
| PEG TRS | 22 | 9 | 100 | 3 | 0.6 | 5 |
| PVB | 44 | 9 | 60 | 0 | 0.2 | 5 |

* Hub Score in the OTC Active Traders table.
** Score /64 derived from the OTC and Exchange product categories in the Traded Products Table.
*** Score based on each of the Key Elements scoring zero for Grey; 1 point for Red; 2 points for Amber; 3 points for Green.

**This table gives the 'rankings' of the European traded gas hubs in my map; there are only 2 Mature hubs and 2 Active hubs, plus 7 Poor hubs**

# Summary of the 3 Main Indicators

The **EFET** Gas Hub Development Study, is a good proxy for evaluating the three Main Indicators across all countries, including those that do not yet have an operational traded gas hub, as it assesses:
5 regulatory conditions,
6 TSO conditions
and 6 market conditions

| HUB | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| NBP | 20 | 20 | 20 | 20 |
| TTF | 19 | 19½ | 19½ | 19 |
| ZTP | 16 | 17½ | 18 | 19 |
| NCG | 15½ | 19 | 19 | 17½ |
| PEGs | 16 | 16½ | 18½ | 17½ |
| GPL | 16 | 19 | 19 | 17 |
| ZEE | 17 | 17 | 17 | 16½ |
| PSV | 10½ | 15 | 15 | 16 |
| VTP | 13 | 13 | 13½ | 16 |
| AOC/PVB | 7 | 7 | 13½ | 16 |
| GTF | 9 | 11 | 14 | 15½ |
| VOB | 8 | 8½ | 9½ | 13 |
| MGP | 5 | 6½ | 9 | 12½ |
| VPGS | 4½ | 5½ | 9½ | 10 |
| SK | 3½ | 7 | 8 | 8½ |
| GR | 4½ | 5½ | 5½ | 6½ |
| UDN | 5½ | 5 | 4 | 5½ |
| UA | n/a | n/a | n/a | 3½ |
| RO | 2½ | 1½ | 2 | 3 |
| BG | 1½ | 1 | 1½ | 1 |

Source: EFET 2017 Review of Gas Hubs Assessments

**This independent analysis, using very different criteria to mine, arrives at much the same conclusions as to the European hubs' stages of development**

# Summary and conclusion

## The future of hubs in a spot-priced gas market

# The future of hubs in a spot-priced gas market

The gas markets are **globalising** helped by traded markets

Liberalisation requires efficient traded markets to benefit all participants, from producers to wholesalers and, finally to the final consumers.

**North America**, **Britain** and **The Netherlands** already benefit from mature gas markets, providing the necessary risk management tools

The **types of products** traded vary widely from hub to hub, continuing the divergence between those hubs being used for balancing activities and those for risk management.

When looking at the Net Churn rates, only **Henry Hub**, **TTF** and **NBP** are mature hubs and are pricing **benchmarks**.

**Asia-Pacific** still has some way to go but there are definite signs of increasing spot trading and hub market initiatives

The JKM index has shown exponential growth in just 2 years.

**The three mature, benchmark gas hubs have helped, alongside the increase in LNG supplies, to open the global gas markets and bring closer correlation**

# *Thank you!*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